

ABSTRACT

Conductive contacts in a semiconductor structure, and methods for forming the conductive components are provided. The method comprises depositing a conductive material over a substrate to fill a contact opening, removing excess material from the substrate leaving the contact within the opening, and then heating treating the contact at a high temperature, preferably with a rapid thermal anneal process, in a reactive gas to remove an undesirable component from the contact, for example, thermal annealing a TiCl_4 -based titanium nitride in ammonia to remove chlorine from the contact, which can be corrosive to an overlying aluminum interconnect at a high concentration. The contacts are useful for providing electrical connection to active components in integrated circuits such as memory devices. In an embodiment of the invention, the contacts comprise boron-doped and/or undoped TiCl_4 -based titanium nitride having a low concentration of chlorine. Boron-doped contacts further possess an increased level of adhesion to the insulative layer to eliminate peeling from the sidewalls of the contact opening and cracking of the insulative layer when formed to a thickness of greater than about 200 angstroms in a high-aspect-ratio opening.